

SEQUENCE LISTING

<110> Hoch, James
Dartois, Veronique

<120> METABOLIC SELECTION METHODS

<130> 234/191

<140> To Be Assigned

<141> Herewith

<160> 33

<170> FastSEQ for Windows Version 3.0

<210> 1

<211> 816

<212> DNA

<213> yia j

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 <212> DNA
 <213> yia 1

<400> 3

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<400> 4

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 <213> yia x2

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<211> 1503

<212> DNA

<213> lyxk

<400> 6

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<210> 7

<211> 660

<212> DNA

<213> yia q

<400> 7

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<210> 8

<211> 858

<212> DNA

<213> yia r

<400> 8

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<211> 714

<212> DNA

<213> yia s

<400> 9

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<210> 10
 <211> 272
 <212> PRT
 <213> YiaJ-Ko

<400> 10

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Asn	Tyr	Pro	Asn	Gly	Cys	Pro	Val	Ala	His	Leu	Ser	Glu	Leu	Ala	Gly	35	40	45	
Leu	Asn	Lys	Ser	Thr	Val	His	Arg	Leu	Leu	Gln	Gly	Leu	Gln	Ser	Cys	50	55	60	
Gly	Tyr	Val	Thr	Pro	Ala	Pro	Ala	Ala	Gly	Ser	Tyr	Ala	Leu	Thr	Thr	65	70	75	80
Lys	Phe	Ile	Arg	Val	Gly	Gln	Lys	Ala	Leu	Ser	Ser	Leu	Asn	Ile	Ile	85	90	95	
His	Val	Ala	Ala	Pro	His	Leu	Glu	Ala	Leu	Asn	Leu	Ala	Thr	Gly	Glu	100	105	110	
Thr	Val	Asn	Phe	Ser	Ser	Arg	Glu	Asp	Asp	His	Ala	Ile	Leu	Ile	Tyr	115	120	125	
Lys	Leu	Glu	Pro	Thr	Thr	Gly	Met	Leu	Arg	Thr	Arg	Ala	Tyr	Ile	Gly	130	135	140	
Gln	His	Met	Arg	Cys	Thr	Ala	Arg	Gln	Trp	Ala	Lys	Ile	Tyr	Met	Ala	145	150	155	160
Phe	Gly	His	Pro	Asp	Tyr	Val	Glu	Ser	Tyr	Trp	Asn	Ser	His	Gln	Glu	165	170	175	
Ile	Ile	Gln	Pro	Leu	Thr	Arg	Asn	Thr	Ile	Thr	Gly	Leu	Pro	Ala	Met	180	185	190	
His	Asp	Glu	Leu	Ala	Gln	Ile	Arg	Glu	Arg	Asn	Met	Ala	Met	Asp	Arg	195	200	205	

Glu Glu Asn Glu Leu Gly Val Ser Cys Leu Ala Val Pro Val Phe Asp
210 215 220

Ile His Gly Arg Val Pro Tyr Ala Ile Ser Ile Ser Leu Ser Thr Ser
225 230 235 240

Arg Leu Lys Gln Val Gly Glu Lys Asn Leu Leu Lys Pro Leu Arg Asp
245 250 255

Thr Ala Glu Ala Ile Ser Arg Glu Leu Gly Phe Ser Val Arg Glu Gly
260 265 270

<210> 11

<211> 332

<212> PRT

<213> YiaK-Ko

<400> 11

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Leu Asp Ala Cys Val Ala Arg Glu Thr Ala Asp Ala Cys Ala Glu Met
20 25 30

Phe Ala Arg Thr Thr Glu Ser Gly Val Tyr Ser His Gly Val Asn Arg
35 40 45

Phe Pro Arg Phe Ile Gln Gln Leu Asp Asn Gly Asp Ile Ile Pro Glu
50 55 60

Ala Gln Pro Gln Arg Val Thr Thr Leu Gly Ala Ile Glu Gln Trp Asp
65 70 75 80

Ala Gln Arg Ser Ile Gly Asn Leu Thr Ala Lys Lys Met Met Asp Arg
85 90 95

Ala Ile Glu Leu Ala Ser Asp His Gly Ile Gly Leu Val Ala Leu Arg
100 105 110

Asn Ala Asn His Trp Met Arg Gly Gly Ser Tyr Gly Trp Gln Ala Ala
115 120 125

Glu Lys Gly Tyr Ile Gly Ile Cys Trp Thr Asn Ser Ile Ala Val Met
130 135 140

Ala Pro Trp Gly Ala Lys Glu Cys Arg Ile Gly Thr Asn Pro Leu Ile
145 150 155 160

Val Ala Ile Pro Ser Thr Pro Ile Thr Met Val Asp Met Ser Met Ser
165 170 175

Met Phe Ser Tyr Gly Met Leu Glu Val Asn Arg Leu Ala Gly Arg Glu
180 185 190

Leu Pro Val Asp Gly Gly Phe Asp Asp Asp Gly Arg Leu Thr Lys Glu
195 200 205

Pro Gly Thr Ile Glu Lys Asn Arg Arg Ile Leu Pro Met Gly Tyr Trp
210 215 220

Lys Gly Ser Gly Leu Ser Ile Val Leu Asp Met Ile Ala Thr Leu Leu
225 230 235 240

Ser Asn Gly Ser Ser Val Ala Glu Val Thr Gln Glu Asn Ser Asp Glu
245 250 255

Tyr Gly Val Ser Gln Ile Phe Ile Ala Ile Glu Val Asp Lys Leu Ile
260 265 270

Asp Gly Ala Thr Arg Asp Ala Lys Leu Gln Arg Ile Met Asp Phe Ile
275 280 285

Thr Thr Ala Glu Arg Ala Asp Glu Asn Val Ala Val Arg Leu Pro Gly
290 295 300

His Glu Phe Thr Arg Leu Leu Asp Glu Asn Arg Arg Asn Gly Ile Thr
305 310 315 320

Val Asp Asp Ser Val Trp Ala Lys Ile Gln Ala Leu
325 330

<210> 12

<211> 154

<212> PRT

<213> YiaL-Ko

<400> 12

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Ala Ile Glu Arg Ala Leu Asp Phe Leu Arg Thr Thr Asp Phe His Ala
20 25 30

Leu Ala Pro Gly Val Val Glu Ile Asp Gly Gln Asn Ile Phe Ala Gln
35 40 45

Val Ile Asp Leu Thr Thr Arg Asp Ala Ala Glu Asn Arg Pro Glu Val
50 55 60

His Arg Arg Tyr Leu Asp Ile Gln Phe Leu Ala Ser Gly Glu Glu Lys
65 70 75 80

Ile Gly Ile Ala Ile Asp Thr Gly Asn Asn Gln Ile Ser Glu Ser Leu
85 90 95

Leu Glu Gln Arg Asp Ile Ile Phe Tyr His Asp Ser Glu His Glu Ser
100 105 110

Phe Phe Glu Met Thr Pro Gly Asn Tyr Ala Ile Phe Phe Pro Gln Asp
115 120 125

Val His Arg Pro Gly Cys Asn Lys Thr Val Ala Thr Pro Ile Arg Lys
130 135 140

Ile Val Val Lys Val Ala Ile Ser Val Leu
145 150

<210> 13
<211> 315
<212> PRT
<213> ORF1

<400> 13

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Pro Cys Ala Pro Ser Phe His Gln Lys Ser Glu Glu Glu Glu Met Glu
20 25 30

Phe Trp Arg Gln Leu Ser Asp Thr Pro Asp Ile Arg Gly Leu Glu Gln
35 40 45

Pro Cys Leu Pro Cys Leu Glu His Leu His Pro Leu Gly Asp Glu Trp
50 55 60

Leu Leu Arg His Thr Pro Gly His Trp Gln Ile Val Val Thr Ala Ile
65 70 75 80

Met Glu Thr Met Arg Arg Arg Gly Glu Asn Gly Gly Phe Gly Leu Ala
85 90 95

Ser Ser Asp Glu Thr Gln Arg Lys Ala Cys Val Glu Tyr Tyr Arg His
100 105 110

Leu Gln Gln Lys Ile Ala Lys Ile Asn Gly Asn Thr Ala Gly Lys Val
115 120 125

Ile Ala Leu Glu Leu His Ala Ala Pro Leu Ala Gly Asn Ala Asn Val
130 135 140

Ala Gln Ala Thr Asp Ala Phe Ala Arg Ser Leu Lys Glu Ile Thr Arg
145 150 155 160

Trp Asp Trp Ser Cys Glu Leu Val Leu Glu His Cys Asp Ala Met Thr
165 170 175

Gly Ser Ala Pro Arg Lys Gly Phe Leu Pro Leu Glu Asn Val Leu Glu
180 185 190

Ala Ile Ala Asp Tyr Asp Val Gly Ile Cys Ile Asn Trp Ala Arg Ser
195 200 205

00540"04500

Ala Ile Glu Gly Arg Asn Thr Val Leu Pro Leu Thr His Thr Gln Gln
 210 215 220

Val Lys Arg Ala Gly Lys Leu Gly Ala Leu Met Phe Ser Gly Thr Thr
 225 230 235 240

Gln Thr Gly Glu Tyr Gly Glu Trp Gln Asp Leu His Ala Pro Phe Ala
 245 250 255

Pro Phe Cys Pro Gln Ser Leu Met Thr Thr Glu His Ala Arg Glu Leu
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Phe Ala Cys Ala Gly Thr Ala Pro Leu Gln Phe Ser Gly Ile Lys Leu
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Leu Glu Ile Asn Ala Ser Ala Asn Val Asp His Arg Ile Ala Ile Leu
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Arg Asp Gly Ile Ser Ala Leu Lys Gln Ala Gln
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<400> 14

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Met Asp Arg Val Asn Ile Ala Phe Ala Met Pro Gly Gly Met Asp Ala
 35 40 45

Asp Leu Gly Ile Ser Ala Thr Met Ala Gly Leu Ala Gly Gly Ile Phe
 50 55 60

Phe Ile Gly Tyr Leu Phe Leu Gln Val Pro Gly Gly Lys Ile Ala Val
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His Gly Ser Gly Lys Lys Phe Ile Gly Trp Ser Leu Val Ala Trp Ala
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Val Ile Ser Val Leu Thr Gly Leu Ile Thr Asn Gln Tyr Gln Leu Leu
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Ala Leu Arg Phe Leu Leu Gly Val Ala Glu Gly Gly Met Leu Pro Val
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Val Leu Thr Met Ile Ser Asn Trp Phe Pro Asp Ala Glu Arg Gly Arg
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Ala Asn Ala Ile Val Ile Met Phe Val Pro Ile Ala Gly Ile Ile Thr
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 Ala Pro Leu Ser Gly Trp Ile Ile Thr Val Leu Asp Trp Arg Trp Leu
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 Phe Ile Ile Glu Gly Leu Leu Ser Leu Val Val Leu Val Leu Trp Ala
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 Tyr Thr Ile Tyr Asp Arg Pro Gln Glu Ala Arg Trp Ile Ser Glu Ala
 195 200 205
 Glu Lys Arg Tyr Leu Val Glu Thr Leu Ala Ala Glu Gln Lys Ala Ile
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 Ala Gly Thr Glu Val Lys Asn Ala Ser Leu Ser Ala Val Leu Ser Asp
 225 230 235 240
 Lys Thr Met Trp Gln Leu Ile Ala Leu Asn Phe Phe Tyr Gln Thr Gly
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 Ile Tyr Gly Tyr Thr Leu Trp Leu Pro Thr Ile Leu Lys Glu Leu Thr
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 His Ser Ser Met Gly Gln Val Gly Met Leu Ala Ile Leu Pro Tyr Val
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 Gly Ala Ile Ala Gly Met Phe Leu Phe Ser Ser Leu Ser Asp Arg Thr
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 Gly Lys Arg Lys Leu Phe Val Cys Leu Pro Leu Ile Gly Phe Ala Leu
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 Cys Met Phe Leu Ser Val Ala Leu Lys Asn Gln Ile Trp Leu Ser Tyr
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 Ala Ala Leu Val Gly Cys Gly Phe Phe Leu Gln Ser Ala Ala Gly Val
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 Phe Trp Thr Ile Pro Ala Arg Leu Phe Ser Ala Glu Met Ala Gly Gly
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 Ala Arg Gly Val Ile Asn Ala Leu Gly Asn Leu Gly Gly Phe Cys Gly
 370 375 380
 Pro Tyr Ala Val Gly Val Leu Ile Thr Leu Tyr Ser Lys Asp Ala Gly
 385 390 395 400
 Val Tyr Cys Leu Ala Ile Ser Leu Ala Leu Ala Ala Leu Met Ala Leu
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 Leu Leu Pro Ala Lys Cys Asp Ala Gly Ala Ala Pro Val Lys Thr Ile
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 Asn Pro His Lys Arg Thr Ala
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Pro	Leu	Gly	Asn	Ala	Ile	Leu	Ser	Ser	Asp	Arg	Arg	Ala	Leu	Lys	Ile
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Val	Gln	Arg	Trp	Gln	Arg	Asp	Arg	Ile	Pro	Glu	Arg	Leu	Tyr	Pro	Val
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Thr	Arg	Gln	Thr	Leu	Trp	Thr	Gly	His	Pro	Ala	Ser	Leu	Leu	Arg	Trp
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Met	Gly	His	Asp	Tyr	Leu	Arg	Trp	Cys	Leu	Thr	Gly	Ala	Lys	Gly	Cys
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Glu	Glu	Ser	Asn	Ile	Ser	Glu	Ser	Asn	Leu	Tyr	Asn	Met	Ala	Met	Gly
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Gln	Tyr	Asp	Pro	Arg	Leu	Thr	Glu	Trp	Leu	Gly	Ile	Gly	Glu	Ile	Asp
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Val	Gly	Gly	Leu	Phe	Asp	Val	Val	Ser	Thr	Ala	Leu	Cys	Ala	Gly	Ile
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Glu	Asp	Glu	Ser	Thr	Leu	Asn	Ala	Val	Met	Gly	Thr	Trp	Ala	Val	Thr
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Ser Gly Ile Ala His Gly Leu Arg Asp His Glu Ala His Pro Tyr Val
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Tyr Gly Arg Tyr Val Asn Asp Gly Gln Tyr Ile Val His Glu Ala Ser
290 295 300

Pro Thr Ser Ser Gly Asn Leu Glu Trp Phe Thr Ala Gln Trp Gly Asp
305 310 315 320

Leu Ser Phe Asp Glu Ile Asn Gln Ala Val Ala Ser Leu Pro Lys Ala
325 330 335

Gly Ser Glu Leu Phe Phe Leu Pro Phe Leu Tyr Gly Ser Asn Ala Gly
340 345 350

Leu Glu Met Thr Cys Gly Phe Tyr Gly Met Gln Ala Leu His Thr Arg
355 360 365

Ala His Leu Leu Gln Ala Val Tyr Glu Gly Val Val Phe Ser His Met
370 375 380

Thr His Leu Ser Arg Met Arg Glu Arg Phe Thr Asn Val Gln Ala Leu
385 390 395 400

Arg Val Thr Gly Gly Pro Ala His Ser Asp Val Trp Met Gln Met Leu
405 410 415

Ala Asp Val Ser Gly Leu Arg Ile Glu Leu Pro Lys Val Glu Glu Thr
420 425 430

Gly Cys Phe Gly Ala Ala Leu Ala Ala Arg Val Gly Thr Gly Val Tyr
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Arg Ser Phe Ser Glu Ala Arg Arg Ala Arg Gln His Pro Val Arg Thr
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Leu Leu Pro Asp Met Thr Ala His Ala Arg Tyr Gln Arg Lys Tyr Arg
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His Tyr Leu His Leu Ile Glu Ala Leu Gln Gly Tyr His Ala Arg Ile
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Lys Glu His Ala Leu
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Glu Ala Gly Thr Ile Leu Cys Leu Thr Glu Gly Leu Ser Ala Val Lys
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Ala Leu Arg Ala Gln Cys Pro Gly Lys Ile Ile Val Ala Asp Trp Lys
 50 55 60

Val Ala Asp Ala Gly Glu Thr Leu Ala Gln Gln Ala Phe Gly Ala Gly
 65 70 75 80

Ala Asn Trp Met Thr Ile Ile Cys Ala Ala Pro Leu Ala Thr Val Glu
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Lys Gly His Ala Val Ala Gln Ala Cys Gly Gly Glu Ile Gln Met Glu
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Leu Phe Gly Asn Trp Thr Leu Asp Asp Ala Arg Ala Trp Tyr Arg Thr
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Gly Val His Gln Ala Ile Tyr His Arg Gly Arg Asp Ala Gln Ala Ser
 130 135 140

Gly Gln Gln Trp Gly Glu Ala Asp Leu Ala Arg Met Lys Ala Leu Ser
 145 150 155 160

Asp Ile Gly Leu Glu Leu Ser Ile Thr Gly Gly Ile Thr Pro Ala Asp
 165 170 175

Leu Pro Leu Phe Lys Asp Ile Asn Val Lys Ala Phe Ile Ala Gly Arg
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Ala Leu Ala Gly Ala Ala His Pro Ala Arg Val Ala Ala Glu Phe His
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Ala Gln Ile Asp Ala Ile Trp Gly Glu Gln His Ala
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Phe Val Glu Met Ser Val Asp Glu Thr Asp Glu Arg Leu Ser Arg Leu
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Glu Trp Thr Pro Ala Gln Arg Ala Ser Leu Val Ser Ala Met Leu Glu
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 Thr Ala Val Ala Ile Pro Ser Met Cys Leu Ser Ala His Arg Arg Phe
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 Pro Phe Gly Ser Arg Asp Glu Ala Val Arg Asp Arg Ala Arg Glu Ile
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 Met Thr Lys Ala Ile Arg Leu Ala Arg Asp Leu Gly Ile Arg Thr Ile
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 Gln Leu Ala Gly Tyr Asp Val Tyr Tyr Glu Glu His Asp Glu Gly Thr
 115 120 125
 Arg Gln Arg Phe Ala Glu Gly Leu Ala Trp Ala Val Glu Gln Ala Ala
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 Ala Ala Gln Val Met Leu Ala Val Glu Ile Met Asp Thr Ala Phe Met
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 Asn Ser Ile Ser Lys Trp Lys Lys Trp Asp Glu Met Leu Ser Ser Pro
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 Trp Phe Thr Val Tyr Pro Asp Val Gly Asn Leu Ser Ala Trp Gly Asn
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 Asp Val Thr Ala Glu Leu Lys Leu Gly Ile Asp Arg Ile Ala Ala Ile
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 His Leu Lys Asp Thr Leu Pro Val Thr Asp Asp Ser Pro Gly Gln Phe
 210 215 220
 Arg Asp Val Pro Phe Gly Glu Gly Cys Val Asp Phe Val Gly Ile Phe
 225 230 235 240
 Lys Thr Leu Arg Glu Leu Asn Tyr Arg Gly Ser Phe Leu Ile Glu Met
 245 250 255
 Trp Thr Glu Lys Ala Ser Glu Pro Val Leu Glu Ile Ile Gln Ala Arg
 260 265 270
 Arg Trp Ile Glu Ser Arg Met Gln Glu Gly Gly Phe Thr Cys
 275 280 285

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Pro Ala His Gly Leu Val Thr Phe Thr Trp Gly Asn Val Ser Ala Val
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Asp Glu Thr Arg Lys Leu Met Val Ile Lys Pro Ser Gly Val Glu Tyr
35 40 45

Glu Val Met Thr Ala Asp Asp Met Val Val Val Glu Met Ala Ser Gly
50 55 60

Lys Val Val Glu Gly Gly Lys Lys Pro Ser Ser Asp Thr Pro Thr His
65 70 75 80

Leu Ala Leu Tyr Arg Arg Tyr Pro Gln Ile Gly Gly Ile Val His Thr
85 90 95

His Ser Arg His Ala Thr Ile Trp Ser Gln Ala Gly Leu Asp Leu Pro
100 105 110

Ala Trp Gly Thr Thr His Ala Asp Tyr Phe Tyr Gly Ala Ile Pro Cys
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Thr Arg Arg Met Thr Val Glu Glu Ile Asn Gly Glu Tyr Glu Tyr Gln
130 135 140

Thr Gly Glu Val Ile Ile Lys Thr Phe Glu Gln Arg Gly Leu Asp Pro
145 150 155 160

Ala Gln Ile Pro Ala Val Leu Val His Ser His Gly Pro Phe Ala Trp
165 170 175

Gly Lys Asp Ala Ala Asp Ala Val His Asn Ala Val Val Leu Glu Glu
180 185 190

Cys Ala Tyr Met Gly Leu Phe Ser Arg Gln Trp Pro Gln Leu Pro Asp
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Met Gln Ser Glu Leu Leu Asp Lys His Tyr Leu Arg Lys His Gly Ala
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Asn Ala Ile Thr Gly Lys Thr Ser Pro Ala Glu Leu Pro Gly
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<210> 20

<211> 282

<212> PRT

<213> YiaJ-Ec

<400> 20

Met Gly Lys Glu Val Met Gly Lys Lys Glu Asn Glu Met Ala Gln Glu
1 5 10 15

Lys Glu Arg Pro Ala Gly Ser Gln Ser Leu Phe Arg Gly Leu Met Leu
20 25 30

Ile Glu Ile Leu Ser Asn Tyr Pro Asn Gly Cys Pro Leu Ala His Leu
35 40 45

Ser Glu Leu Ala Gly Leu Asn Lys Ser Thr Val His Arg Leu Leu Gln
 50 55 60
 Gly Leu Gln Ser Cys Gly Tyr Val Thr Thr Ala Pro Ala Ala Gly Ser
 65 70 75 80
 Tyr Arg Leu Thr Thr Lys Phe Ile Ala Val Gly Gln Lys Ala Leu Ser
 85 90 95
 Ser Leu Asn Ile Ile His Ile Ala Ala Pro His Leu Glu Ala Leu Asn
 100 105 110
 Ile Ala Thr Gly Glu Thr Ile Asn Phe Ser Ser Arg Glu Asp Asp His
 115 120 125
 Ala Ile Leu Ile Tyr Lys Leu Glu Pro Thr Thr Gly Met Leu Arg Thr
 130 135 140
 Arg Ala Tyr Ile Gly Gln His Met Pro Leu Tyr Cys Ser Ala Met Gly
 145 150 155 160
 Lys Ile Tyr Met Ala Phe Gly His Pro Asp Tyr Val Lys Ser Tyr Trp
 165 170 175
 Glu Ser His Gln His Glu Ile Gln Pro Leu Thr Arg Asn Thr Ile Thr
 180 185 190
 Glu Leu Pro Ala Met Phe Asp Glu Leu Ala His Ile Arg Glu Ser Gly
 195 200 205
 Ala Ala Met Asp Arg Glu Glu Asn Glu Leu Gly Val Ser Cys Ile Ala
 210 215 220
 Val Pro Val Phe Asp Ile His Gly Arg Val Pro Tyr Ala Val Ser Ile
 225 230 235 240
 Ser Leu Ser Thr Ser Arg Leu Lys Gln Val Gly Glu Lys Asn Leu Leu
 245 250 255
 Lys Pro Leu Arg Glu Thr Ala Gln Ala Ile Ser Asn Glu Leu Gly Phe
 260 265 270
 Thr Val Arg Asp Asp Leu Gly Ala Ile Thr
 275 280

<210> 21
 <211> 268
 <212> PRT
 <213> YiaJ-Hi

<400> 21

Met Asn Ile Glu Val Lys Met Glu Lys Glu Lys Ser Leu Gly Asn Gln
 1 5 10 15

Ala Leu Ile Arg Gly Leu Arg Leu Leu Asp Ile Leu Ser Asn Tyr Pro
20 25 30

Asn Gly Cys Pro Leu Ala Lys Leu Ala Glu Leu Ala Asn Leu Asn Lys
35 40 45

Ser Thr Ala His Arg Leu Leu Gln Gly Leu Gln Asn Glu Gly Tyr Val
50 55 60

Lys Pro Ala Asn Ala Ala Gly Ser Tyr Arg Leu Thr Ile Lys Cys Leu
65 70 75 80

Ser Ile Gly Gln Lys Val Leu Ser Ser Met Asn Ile Ile His Val Ala
85 90 95

Ser Pro Tyr Leu Glu Gln Leu Asn Leu Lys Leu Gly Glu Thr Ile Asn
100 105 110

Phe Ser Lys Arg Glu Asp Asp His Ala Ile Met Ile Tyr Lys Leu Glu
115 120 125

Pro Thr Asn Gly Met Leu Lys Thr Arg Ala Tyr Ile Gly Gln Tyr Leu
130 135 140

Lys Leu Tyr Cys Ser Ala Met Gly Lys Ile Phe Leu Ala Tyr Glu Lys
145 150 155 160

Lys Val Asp Tyr Leu Ser His Tyr Trp Gln Ser His Gln Arg Glu Ile
165 170 175

Lys Lys Leu Thr Arg Tyr Thr Ile Thr Glu Leu Asp Asp Ile Lys Leu
180 185 190

Glu Leu Glu Thr Ile Arg Gln Thr Ala Tyr Ala Met Asp Arg Glu Glu
195 200 205

Asn Glu Leu Gly Val Thr Cys Ile Ala Cys Pro Ile Phe Asp Ser Phe
210 215 220

Gly Gln Val Glu Tyr Ala Ile Ser Val Ser Met Ser Ile Tyr Arg Leu
225 230 235 240

Asn Lys Phe Gly Thr Asp Ala Phe Leu Gln Glu Ile Arg Lys Thr Ala
245 250 255

Glu Gln Ile Ser Leu Glu Leu Gly Tyr Glu Asn Ile
260 265

<210> 22
<211> 332
<212> PRT
<213> YiaK-Ec

<400> 22

Met Lys Val Thr Phe Glu Gln Leu Lys Ala Ala Phe Asn Arg Val Leu
 1 5 10 15
 Ile Ser Arg Gly Val Asp Ser Glu Thr Ala Asp Ala Cys Ala Glu Met
 20 25 30
 Phe Ala Arg Thr Thr Glu Ser Gly Val Tyr Ser His Gly Val Asn Arg
 35 40 45
 Phe Pro Arg Phe Ile Gln Gln Leu Glu Asn Gly Asp Ile Ile Pro Asp
 50 55 60
 Ala Gln Pro Lys Arg Ile Thr Ser Leu Gly Ala Ile Glu Gln Trp Asp
 65 70 75 80
 Ala Gln Arg Ser Ile Gly Asn Leu Thr Ala Lys Lys Met Met Asp Arg
 85 90 95
 Ala Ile Glu Leu Ala Ala Asp His Gly Ile Gly Leu Val Ala Leu Arg
 100 105 110
 Asn Ala Asn His Trp Met Arg Gly Gly Ser Tyr Gly Trp Gln Ala Ala
 115 120 125
 Glu Lys Gly Tyr Ile Gly Ile Cys Trp Thr Asn Ser Ile Ala Val Met
 130 135 140
 Pro Pro Trp Gly Ala Lys Glu Cys Arg Ile Gly Thr Asn Pro Leu Ile
 145 150 155 160
 Val Ala Ile Pro Ser Thr Pro Ile Thr Met Val Asp Met Ser Met Ser
 165 170 175
 Met Phe Ser Tyr Gly Met Leu Glu Val Asn Arg Leu Ala Gly Arg Gln
 180 185 190
 Leu Pro Val Asp Gly Gly Phe Asp Asp Glu Gly Asn Leu Thr Lys Glu
 195 200 205
 Pro Gly Val Ile Glu Lys Asn Arg Arg Ile Leu Pro Met Gly Tyr Trp
 210 215 220
 Lys Gly Ser Gly Met Ser Ile Val Leu Asp Met Ile Ala Thr Leu Leu
 225 230 235 240
 Ser Asp Gly Ala Ser Val Ala Glu Val Thr Gln Asp Asn Ser Asp Glu
 245 250 255
 Tyr Gly Ile Ser Gln Ile Phe Ile Ala Ile Glu Val Asp Lys Leu Ile
 260 265 270
 Asp Gly Pro Thr Arg Asp Ala Lys Leu Gln Arg Ile Met Asp Tyr Val
 275 280 285

Thr Ser Ala Glu Arg Ala Asp Glu Asn Gln Ala Ile Arg Leu Pro Gly
290 295 300

His Glu Phe Thr Thr Leu Leu Ala Glu Asn Arg Arg Asn Gly Ile Thr
305 310 315 320

Val Asp Asp Ser Val Trp Ala Lys Ile Gln Ala Leu
325 330

<210> 23

<211> 332

<212> PRT

<213> YiaK-Hi

<400> 23

Met Arg Val Ser Tyr Asp Glu Leu Lys Asn Glu Phe Lys Arg Val Leu
1 5 10 15

Leu Asp Arg Gln Leu Thr Glu Glu Leu Ala Glu Glu Cys Ala Thr Ala
20 25 30

Phe Thr Asp Thr Thr Gln Ala Gly Ala Tyr Ser His Gly Ile Asn Arg
35 40 45

Phe Pro Arg Phe Ile Gln Gln Leu Glu Gln Gly Asp Ile Val Pro Asn
50 55 60

Ala Ile Pro Thr Lys Val Leu Ser Leu Gly Ser Ile Glu Gln Trp Asp
65 70 75 80

Ala His Gln Ala Ile Gly Asn Leu Thr Ala Lys Lys Met Met Asp Arg
85 90 95

Ala Ile Glu Leu Ala Ser Gln His Gly Val Gly Val Ile Ala Leu Arg
100 105 110

Asn Ala Asn His Trp Met Arg Gly Gly Ser Tyr Gly Trp Gln Ala Ala
115 120 125

Glu Lys Gly Tyr Ile Gly Ile Cys Trp Thr Asn Ala Leu Ala Val Met
130 135 140

Pro Pro Trp Gly Ala Lys Glu Cys Arg Ile Gly Thr Asn Pro Leu Ile
145 150 155 160

Ile Ala Val Pro Thr Thr Pro Ile Thr Met Val Asp Met Ser Cys Ser
165 170 175

Met Tyr Ser Tyr Gly Met Leu Glu Val His Arg Leu Ala Gly Arg Gln
180 185 190

Thr Phe Val Asp Ala Gly Phe Asp Asp Glu Gly Asn Leu Thr Arg Asp
195 200 205

Pro Ser Ile Val Glu Lys Asn Arg Arg Leu Leu Pro Met Gly Phe Trp
 210 215 220

Lys Gly Ser Gly Leu Ser Ile Val Leu Asp Met Ile Ala Thr Leu Leu
 225 230 235 240

Ser Asn Gly Glu Ser Thr Val Ala Val Thr Glu Asp Lys Asn Asp Glu
 245 250 255

Tyr Cys Val Ser Gln Val Phe Ile Ala Ile Glu Val Asp Arg Leu Ile
 260 265 270

Asp Gly Lys Ser Lys Asp Glu Lys Leu Asn Arg Ile Met Asp Tyr Val
 275 280 285

Lys Thr Ala Glu Arg Ser Asp Pro Thr Gln Ala Val Arg Leu Pro Gly
 290 295 300

His Glu Phe Thr Thr Ile Leu Ser Asp Asn Gln Thr Asn Gly Ile Pro
 305 310 315 320

Val Asp Glu Arg Val Trp Ala Lys Leu Lys Thr Leu
 325 330

<210> 24
 <211> 155
 <212> PRT
 <213> YiaL-Ec
 <400> 24

Met Ile Phe Gly His Ile Ala Gln Pro Asn Pro Cys Arg Leu Pro Ala
 1 5 10 15

Ala Ile Glu Lys Ala Leu Asp Phe Leu Arg Ala Thr Asp Phe Asn Ala
 20 25 30

Leu Glu Pro Gly Val Val Glu Ile Asp Gly Lys Asn Ile Tyr Thr Gln
 35 40 45

Ile Ile Asp Leu Thr Thr Arg Glu Ala Val Val Asn Arg Pro Glu Val
 50 55 60

His Arg Arg Tyr Ile Asp Ile Gln Phe Leu Ala Trp Gly Glu Glu Lys
 65 70 75 80

Ile Gly Ile Ala Ile Asp Thr Gly Asn Asn Lys Val Ser Glu Ser Leu
 85 90 95

Leu Glu Gln Arg Asn Ile Ile Phe Tyr His Asp Ser Glu His Glu Ser
 100 105 110

Phe Ile Glu Met Ile Pro Gly Ser Tyr Ala Ile Phe Phe Pro Gln Asp
 115 120 125

Val His Arg Pro Gly Cys Ile Met Gln Thr Ala Ser Glu Ile Arg Lys
130 135 140

Ile Val Val Lys Val Ala Leu Thr Ala Leu Asn
145 150 155

<210> 25
<211> 155
<212> PRT
<213> YiaL-Hi

<400> 25

Met Ile Ile Ser Ser Leu Thr Asn Pro Asn Phe Lys Val Gly Leu Pro
1 5 10 15

Lys Val Ile Ala Glu Val Cys Asp Tyr Leu Asn Thr Leu Asp Leu Asn
20 25 30

Ala Leu Glu Asn Gly Arg His Asp Ile Asn Asp Gln Ile Tyr Met Asn
35 40 45

Val Met Glu Pro Glu Thr Ala Glu Pro Ser Ser Lys Lys Ala Glu Leu
50 55 60

His His Glu Tyr Leu Asp Val Gln Val Leu Ile Arg Gly Thr Glu Asn
65 70 75 80

Ile Glu Val Gly Ala Thr Tyr Pro Asn Leu Ser Lys Tyr Glu Asp Tyr
85 90 95

Asn Glu Ala Asp Asp Tyr Gln Leu Cys Ala Asp Ile Asp Asp Lys Phe
100 105 110

Thr Val Thr Met Lys Pro Lys Met Phe Ala Val Phe Tyr Pro Tyr Glu
115 120 125

Pro His Lys Pro Cys Cys Val Val Asn Gly Lys Thr Glu Lys Ile Lys
130 135 140

Lys Leu Val Val Lys Val Pro Val Lys Leu Ile
145 150 155

<210> 26
<211> 498
<212> PRT
<213> LyxK-Ec

<400> 26

Met Thr Gln Tyr Trp Leu Gly Leu Asp Cys Gly Gly Ser Trp Leu Lys
1 5 10 15

Ala Gly Leu Tyr Asp Arg Glu Gly Arg Glu Ala Gly Val Gln Arg Leu
 20 25 30
 Pro Leu Cys Ala Leu Ser Pro Gln Pro Gly Trp Ala Glu Arg Asp Met
 35 40 45
 Ala-Glu Leu Trp Gln Cys Cys Met Ala Val Ile Arg Ala Leu Leu Thr
 50 55 60
 His Ser Gly Val Ser Gly Glu Gln Ile Val Gly Ile Gly Ile Ser Ala
 65 70 75 80
 Gln Gly Lys Gly Leu Phe Leu Leu Asp Lys Asn Asp Lys Pro Leu Gly
 85 90 95
 Asn Ala Ile Leu Ser Ser Asp Arg Arg Ala Met Glu Ile Val Arg Arg
 100 105 110
 Trp Gln Glu Asp Gly Ile Pro Glu Lys Leu Tyr Pro Leu Thr Arg Gln
 115 120 125
 Thr Leu Trp Thr Gly His Pro Val Ser Leu Leu Arg Trp Leu Lys Glu
 130 135 140
 His Glu Pro Glu Arg Tyr Ala Gln Ile Gly Cys Val Met Met Thr His
 145 150 155 160
 Asp Tyr Leu Arg Trp Cys Leu Thr Gly Val Lys Gly Cys Glu Glu Ser
 165 170 175
 Asn Ile Ser Glu Ser Asn Leu Tyr Asn Met Ser Leu Gly Glu Tyr Asp
 180 185 190
 Pro Cys Leu Thr Asp Trp Leu Gly Ile Ala Glu Ile Asn His Ala Leu
 195 200 205
 Pro Pro Val Val Gly Ser Ala Glu Ile Cys Gly Glu Ile Thr Ala Gln
 210 215 220
 Thr Ala Ala Leu Thr Gly Leu Lys Ala Gly Thr Pro Val Val Gly Gly
 225 230 235 240
 Leu Phe Asp Val Val Ser Thr Ala Leu Cys Ala Gly Ile Glu Asp Glu
 245 250 255
 Phe Thr Leu Asn Ala Val Met Gly Thr Trp Ala Val Thr Ser Gly Ile
 260 265 270
 Thr Arg Gly Leu Arg Asp Gly Glu Ala His Pro Tyr Val Tyr Gly Arg
 275 280 285
 Tyr Val Asn Asp Gly Glu Phe Ile Val His Glu Ala Ser Pro Thr Ser
 290 295 300
 Ser Gly Asn Leu Glu Trp Phe Thr Ala Gln Trp Gly Glu Ile Ser Phe
 305 310 315 320

Asp Glu Ile Asn Gln Ala Val Ala Ser Leu Pro Lys Ala Gly Gly Asp
325 330 335

Leu Phe Phe Leu Pro Phe Leu Tyr Gly Ser Asn Ala Gly Leu Glu Met
340 345 350

Thr Ser Gly Phe Tyr Gly Met Gln Ala Ile His Thr Arg Ala His Leu
355 360 365

Leu Gln Ala Ile Tyr Glu Gly Val Val Phe Ser His Met Thr His Leu
370 375 380

Asn Arg Met Arg Glu Arg Phe Thr Asp Val His Thr Leu Arg Val Thr
385 390 395 400

Gly Gly Pro Ala His Ser Asp Val Trp Met Gln Met Leu Ala Asp Val
405 410 415

Ser Gly Leu Arg Ile Glu Leu Pro Gln Val Glu Glu Thr Gly Cys Phe
420 425 430

Gly Ala Ala Leu Ala Ala Arg Val Gly Thr Gly Val Tyr His Asn Phe
435 440 445

Ser Glu Ala Gln Arg Asp Leu Arg His Pro Val Arg Thr Leu Leu Pro
450 455 460

Asp Met Thr Ala His Gln Leu Tyr Gln Lys Lys Tyr Gln Arg Tyr Gln
465 470 475 480

His Leu Ile Ala Ala Leu Gln Gly Phe His Ala Arg Ile Lys Glu His
485 490 495

Thr Leu

<210> 27

<211> 485

<212> PRT

<213> LyxK-Hi

<400> 27

Met His Tyr Tyr Leu Gly Ile Asp Cys Gly Gly Thr Phe Ile Lys Ala
1 5 10 15

Ala Ile Phe Asp Gln Asn Gly Thr Leu Gln Ser Ile Ala Arg Arg Asn
20 25 30

Ile Pro Ile Ile Ser Glu Lys Pro Gly Tyr Ala Glu Arg Asp Met Asp
35 40 45

Glu Leu Trp Asn Leu Cys Ala Gln Val Ile Gln Lys Thr Ile Arg Gln
50 55 60

Ser Ser Ile Leu Pro Gln Gln Ile Lys Ala Ile Gly Ile Ser Ala Gln
 65 70 75 80
 Gly Lys Gly Ala Phe Phe Leu Asp Lys Asp Asn Lys Pro Leu Gly Arg
 85 90 95
 Ala Ile Leu Ser Ser Asp Gln Arg Ala Tyr Glu Ile Val Gln Cys Trp
 100 105 110
 Gln Lys Glu Asn Ile Leu Gln Lys Phe Tyr Pro Ile Thr Leu Gln Thr
 115 120 125
 Leu Trp Met Gly His Pro Val Ser Ile Leu Arg Trp Ile Lys Glu Asn
 130 135 140
 Glu Pro Ser Arg Tyr Glu Gln Ile His Thr Ile Leu Met Ser His Asp
 145 150 155 160
 Tyr Leu Arg Phe Cys Leu Thr Glu Lys Leu Tyr Cys Glu Glu Thr Asn
 165 170 175
 Ile Ser Glu Ser Asn Phe Tyr Asn Met Arg Glu Gly Lys Tyr Asp Ile
 180 185 190
 Gln Leu Ala Lys Leu Phe Gly Ile Thr Glu Cys Ile Asp Lys Leu Pro
 195 200 205
 Pro Ile Ile Lys Ser Asn Lys Ile Ala Gly Tyr Val Thr Ser Arg Ala
 210 215 220
 Ala Glu Gln Ser Gly Leu Val Glu Gly Ile Pro Val Val Gly Gly Leu
 225 230 235 240
 Phe Asp Val Val Ser Thr Ala Leu Cys Ala Asp Leu Lys Asp Asp Gln
 245 250 255
 His Leu Asn Val Val Leu Gly Thr Trp Ser Val Val Ser Gly Val Thr
 260 265 270
 His Tyr Ile Asp Asp Asn Gln Thr Ile Pro Phe Val Tyr Gly Lys Tyr
 275 280 285
 Pro Glu Lys Asn Lys Phe Ile Ile His Glu Ala Ser Pro Thr Ser Ala
 290 295 300
 Gly Asn Leu Glu Trp Phe Val Asn Gln Phe Asn Leu Pro Asn Tyr Asp
 305 310 315 320
 Asp Ile Asn His Glu Ile Ala Lys Leu Lys Pro Ala Ser Ser Ser Val
 325 330 335
 Leu Phe Ala Pro Phe Leu Tyr Gly Ser Asn Ala Lys Leu Gly Met Gln
 340 345 350
 Ala Gly Phe Tyr Gly Ile Gln Ser His His Thr Gln Ile His Leu Leu
 355 360 365

Gln Ala Ile Tyr Glu Gly Val Ile Phe Ser Leu Met Ser His Leu Glu
370 375 380

Arg Met Gln Val Arg Phe Pro Asn Ala Ser Thr Val Arg Val Thr Gly
385 390 395 400

Gly Pro Ala Lys Ser Glu Val Trp Met Gln Met Leu Ala Asp Ile Ser
405 410 415

Gly Met Arg Leu Glu Ile Pro Asn Ile Glu Glu Thr Gly Cys Leu Gly
420 425 430

Ala Ala Leu Met Ala Met Gln Ala Glu Ser Ala Val Glu Ile Ser Gln
435 440 445

Ile Leu Asn Ile Asp Arg Lys Ile Phe Leu Pro Asp Lys Asn Gln Tyr
450 455 460

Ser Lys Tyr Gln His Lys Tyr His Arg Tyr Leu Lys Phe Ile Glu Ala
465 470 475 480

Leu Lys Asn Leu Asp
485

<210> 28

<211> 220

<212> PRT

<213> YiaQ-Ec

<400> 28

Met Ser Arg Pro Leu Leu Gln Leu Ala Leu Asp His Ser Ser Leu Glu
1 5 10 15

Ala Ala Gln Arg Asp Val Thr Leu Leu Lys Asp Ser Val Asp Ile Val
20 25 30

Glu Ala Gly Thr Ile Leu Cys Leu Asn Glu Gly Leu Gly Ala Val Lys
35 40 45

Ala Leu Arg Glu Gln Cys Pro Asp Lys Ile Ile Val Ala Asp Trp Lys
50 55 60

Val Ala Asp Ala Gly Glu Thr Leu Ala Gln Gln Ala Phe Gly Ala Gly
65 70 75 80

Ala Asn Trp Met Thr Ile Ile Cys Ala Ala Pro Leu Ala Thr Val Glu
85 90 95

Lys Gly His Ala Met Ala Gln Arg Cys Gly Gly Glu Ile Gln Ile Glu
100 105 110

Leu Phe Gly Asn Trp Thr Leu Asp Asp Ala Arg Asp Trp His Arg Ile
115 120 125

Gly Val Arg Gln Ala Ile Tyr His Arg Gly Arg Asp Ala Gln Ala Ser
130 135 140

Gly Gln Gln Trp Gly Glu Ala Asp Leu Ala Arg Met Lys Ala Leu Ser
145 150 155 160

Asp Ile Gly Leu Glu Leu Ser Ile Thr Gly Gly Ile Thr Pro Ala Asp
165 170 175

Leu Pro Leu Phe Lys Asp Ile Arg Val Lys Ala Phe Ile Ala Gly Arg
180 185 190

Ala Leu Ala Gly Ala Ala Asn Pro Ala Gln Val Ala Gly Asp Phe His
195 200 205

Ala Gln Ile Asp Ala Ile Trp Gly Gly Ala Arg Ala
210 215 220

<210> 29

<211> 225

<212> PRT

<213> YiaQ-Hi

<400> 29

Met Gly Lys Pro Leu Leu Gln Ile Ala Leu Asp Ala Gln Tyr Leu Glu
1 5 10 15

Thr Ala Leu Val Asp Val Lys Gln Ile Glu His Asn Ile Asp Ile Ile
20 25 30

Glu Val Gly Thr Ile Leu Ala Cys Ser Glu Gly Met Arg Ala Val Arg
35 40 45

Ile Leu Arg Ala Leu Tyr Pro Asn Gln Ile Leu Val Cys Asp Leu Lys
50 55 60

Thr Thr Asp Ala Gly Ala Thr Leu Ala Lys Met Ala Phe Glu Ala Gly
65 70 75 80

Ala Asp Trp Leu Thr Val Ser Ala Ala Ala His Pro Ala Thr Lys Ala
85 90 95

Ala Cys Gln Lys Val Ala Glu Glu Phe Asn Lys Ile Gln Pro Asn Leu
100 105 110

Gly Val Pro Lys Glu Ile Gln Ile Glu Leu Tyr Gly Asn Trp Asn Phe
115 120 125

Asp Glu Val Lys Asn Trp Leu Gln Leu Gly Ile Lys Gln Ala Ile Tyr
130 135 140

His Arg Ser Arg Asp Ala Glu Leu Ser Gly Leu Ser Trp Ser Asn Gln
145 150 155 160

Asp Ile Glu Asn Ile Glu Lys Leu Asp Ser Leu Gly Ile Glu Leu Ser
165 170 175

Ile Thr Gly Gly Ile Thr Pro Asp Asp Leu His Leu Phe Lys Asn Thr
180 185 190

Lys Asn Leu Lys Ala Phe Ile Ala Gly Arg Ala Leu Val Gly Lys Ser
195 200 205

Gly Arg Glu Ile Ala Glu Gln Leu Lys Gln Lys Ile Gly Gln Phe Trp
210 215 220

Ile
225

<210> 30
<211> 297
<212> PRT
<213> YiaR-Ec

<400> 30

Met Arg Lys Ser Thr Leu Ser Gly Glu Val Arg Val Arg Asn His Gln
1 5 10 15

Leu Gly Ile Tyr Glu Lys Ala Leu Ala Lys Asp Leu Ser Trp Pro Glu
20 25 30

Arg Leu Val Leu Ala Lys Ser Cys Gly Phe Asp Phe Val Glu Met Ser
35 40 45

Val Asp Glu Thr Asp Glu Arg Leu Ser Arg Leu Asp Trp Ser Ala Ala
50 55 60

Gln Arg Thr Ser Leu Val Ala Ala Met Ile Glu Thr Gly Val Gly Ile
65 70 75 80

Pro Ser Met Cys Leu Ser Ala His Arg Arg Phe Pro Phe Gly Ser Arg
85 90 95

Asp Glu Ala Val Arg Glu Arg Ala Arg Glu Ile Met Ser Lys Ala Ile
100 105 110

Arg Leu Ala Arg Asp Leu Gly Ile Arg Thr Ile Gln Leu Ala Gly Tyr
115 120 125

Asp Val Tyr Tyr Glu Asp His Asp Glu Gly Thr Arg Gln Arg Phe Ala
130 135 140

Glu Gly Leu Ala Trp Ala Val Glu Gln Ala Ala Ala Ser Gln Val Met
145 150 155 160

Leu Ala Val Glu Ile Met Asp Thr Ala Phe Met Asn Ser Ile Ser Lys
165 170 175

Trp Lys Lys Trp Asp Glu Met Leu Ala Ser Pro Trp Phe Thr Val Tyr
 180 185 190
 Pro Asp Val Gly Asn Leu Ser Ala Trp Gly Asn Asp Val Pro Ala Glu
 195 200 205
 Leu Lys Leu Gly Ile Asp Arg Ile Ala Ala Ile His Leu Lys Asp Thr
 210 215 220
 Gln Pro Val Thr Gly Gln Ser Pro Gly Gln Phe Arg Asp Val Pro Phe
 225 230 235 240
 Gly Glu Gly Cys Val Asp Phe Val Gly Ile Phe Lys Thr Leu His Lys
 245 250 255
 Leu Asn Tyr Arg Gly Ser Phe Leu Ile Glu Met Trp Thr Glu Lys Ala
 260 265 270
 Lys Glu Pro Val Leu Glu Ile Ile Gln Ala Arg Arg Trp Ile Glu Ala
 275 280 285
 Arg Met Gln Glu Ala Gly Phe Ile Cys
 290 295

<210> 31
 <211> 286
 <212> PRT
 <213> YiaR-Hi

<400> 31

Met Lys Lys His Lys Ile Gly Ile Tyr Glu Lys Ala Leu Pro Lys Asn
 1 5 10 15
 Ile Thr Trp Gln Glu Arg Leu Ser Leu Ala Lys Ala Cys Gly Phe Glu
 20 25 30
 Phe Ile Glu Met Ser Ile Asp Glu Ser Asn Asp Arg Leu Ser Arg Leu
 35 40 45
 Asn Trp Thr Lys Ser Glu Arg Ile Ala Leu His Gln Ser Ile Ile Gln
 50 55 60
 Ser Gly Ile Thr Ile Pro Ser Met Cys Leu Ser Ala His Arg Arg Phe
 65 70 75 80
 Pro Phe Gly Ser Lys Asp Lys Lys Ile Arg Gln Lys Ser Phe Glu Ile
 85 90 95
 Met Glu Lys Ala Ile Asp Leu Ser Val Asn Leu Gly Ile Arg Thr Ile
 100 105 110
 Gln Leu Ala Gly Tyr Asp Val Tyr Tyr Glu Lys Gln Asp Glu Glu Thr
 115 120 125

Ile Lys Tyr Phe Gln Glu Gly Ile Glu Phe Ala Val Thr Leu Ala Ala
130 135 140

Ser Ala Gln Val Thr Leu Ala Val Glu Ile Met Asp Thr Pro Phe Met
145 150 155 160

Ser Ser Ile Ser Arg Trp Lys Lys Trp Asp Thr Ile Ile Asn Ser Pro
165 170 175

Trp Phe Thr Val Tyr Pro Asp Ile Gly Asn Leu Ser Ala Trp Asn Asn
180 185 190

Asn Ile Glu Glu Glu Leu Thr Leu Gly Ile Asp Lys Ile Ser Ala Ile
195 200 205

His Leu Lys Asp Thr Tyr Pro Val Thr Glu Thr Ser Lys Gly Gln Phe
210 215 220

Arg Asp Val Pro Phe Gly Gln Gly Cys Val Asp Phe Val His Phe Phe
225 230 235 240

Ser Leu Leu Lys Lys Leu Asn Tyr Arg Gly Ala Phe Leu Ile Glu Met
245 250 255

Trp Thr Glu Lys Asn Glu Glu Pro Leu Leu Glu Ile Ile Gln Ala Arg
260 265 270

Lys Trp Ile Val Gln Gln Met Glu Lys Ala Gly Leu Leu Cys
275 280 285

<210> 32

<211> 231

<212> PRT

<213> YiaS-Ec

<400> 32

Met Leu Glu Gln Leu Lys Ala Asp Val Leu Ala Ala Asn Leu Ala Leu
1 5 10 15

Pro Ala His His Leu Val Thr Phe Thr Trp Gly Asn Val Ser Ala Val
20 25 30

Asp Glu Thr Arg Gln Trp Met Val Ile Lys Pro Ser Gly Val Glu Tyr
35 40 45

Asp Val Met Thr Ala Asp Asp Met Val Val Val Glu Ile Ala Ser Gly
50 55 60

Lys Val Val Glu Gly Ser Lys Lys Pro Ser Ser Asp Thr Pro Thr His
65 70 75 80

Leu Ala Leu Tyr Arg Arg Tyr Ala Glu Ile Gly Gly Ile Val His Thr
85 90 95

His Ser Arg His Ala Thr Ile Trp Ser Gln Ala Gly Leu Asp Leu Pro
 100 105 110
 Ala Trp Gly Thr Thr His Ala Asp Tyr Phe Tyr Gly Ala Ile Pro Cys
 115 120 125
 Thr Arg Gln Met Thr Ala Glu Glu Ile Asn Gly Glu Tyr Glu Tyr Gln
 130 135 140
 Thr Gly Glu Val Ile Ile Glu Thr Phe Glu Glu Arg Gly Arg Ser Pro
 145 150 155 160
 Ala Gln Ile Pro Ala Val Leu Val His Ser His Gly Pro Phe Ala Trp
 165 170 175
 Gly Lys Asn Ala Ala Asp Ala Val His Asn Ala Val Val Leu Glu Glu
 180 185 190
 Cys Ala Tyr Met Gly Leu Phe Ser Arg Gln Leu Ala Pro Gln Leu Pro
 195 200 205
 Ala Met Gln Asn Glu Leu Leu Asp Lys His Tyr Leu Arg Lys His Gly
 210 215 220
 Ala Asn Ala Tyr Tyr Gly Gln
 225 230

<210> 33
 <211> 231
 <212> PRT
 <213> YiaS-Hi

<400> 33

Met Leu Ala Gln Leu Lys Lys Glu Val Phe Glu Ala Asn Leu Ala Leu
 1 5 10 15
 Pro Lys His His Leu Val Thr Phe Thr Trp Gly Asn Val Ser Ala Ile
 20 25 30
 Asp Arg Glu Lys Asn Leu Val Val Ile Lys Pro Ser Gly Val Asp Tyr
 35 40 45
 Asp Val Met Thr Glu Asn Asp Met Val Val Val Asp Leu Phe Thr Gly
 50 55 60
 Asn Ile Val Glu Gly Asn Lys Lys Pro Ser Ser Asp Thr Pro Thr His
 65 70 75 80
 Leu Glu Leu Tyr Arg Gln Phe Pro His Ile Gly Gly Ile Val His Thr
 85 90 95
 His Ser Arg His Ala Thr Ile Trp Ala Gln Ala Gly Leu Asp Ile Ile
 100 105 110

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